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SHARP 21ES251E SERVICE MANUAL

Quick Links

Service Manual
Horizontal ,Vertical,Deflection Loop Adjustment
Solid State Device Base Diagram
Description of Schematic Diagram
Crt Block

Table of Contents

Features
Contents
Warning
service manual
colour television
sharp corporation
Specifications
Adjustment precautions
USer data in service mode
Shipping setting & checking
Pre-adjustment checking
Focus adjustment
H-VCO, VIF-VCO & S-TRAP fo ADJUSTMENT
Horizontal ,vertical,deflection loop adjustment
No picture No Sound
Wave form
Solid state device base diagram
Description of schematic diagram
Voltage measurement conditions
Waveform measurement conditions
CRT Block
Other ManualsLib Projects

SHARP SERVICE MANUAL

COLOUR TELEVISION

Chassis No. GA-8S

MODEL :

21ES251E
21ES253E
21ES353E

In the interests of user-safety (Required by safety regulations in some countries) the set should be restored to its original condition and only parts identical to those specified should be used.

FEATURES

- ♦ Multi 21 System, 100-CH Program Memory
- ♦ Full Auto Search System
- ♦ NTSC Colour Comb Filter
- ♦ CATV (Hyperband) Ready
- ♦ NTSC Colour Comb Filter Function
- ♦ High Contrast Picture (Black Strecth Circuit)
- ♦ White Temperature Select
- ♦ English Language OSD
- ♦ Blueback Function Noise Mute
- ♦ OFF Timer & Child Lock
- ♦ Hotel Mode & AV Mode (Movie/Music/News)
- ♦ Surround Sound Effect
- ♦ Rear AV-IN Terminal
- ♦ Rear AV-OUT Terminal
- ♦ Save Mode
- ♦ AV Stereo & Equalizer

CONTENTS

	Page
♦SPECIFICATIONS	2
♦IMPORTANT SERVICE NOTES	2
♦ADJUSTMENT PRECAUTIONS	3
♦TROUBLE SHOOTING TABLE	16
♦WAVEFORMS	18
♦SOLID STATE DEVICE BASE DIAGRAM	19
♦DESCRIPTION OF SCHEMATIC DIAGRAM	20
♦DIAGRAM:	
♦DIAGRAM BLOCK CRT	21
♦DIAGRAM SCHEMATIC CRT	22
♦MAIN BLOCK	23
♦MAIN SCHEMATIC	24
♦REPLACEMENT PARTS LIST	

WARNING

The chassis in this receiver is partially hot. Use an isolation transformer between the line cord plug and power receptacle, when servicing this chassis. To prevent electric shock, do not remove cover. No user - serviceable parts inside. Refer servicing to qualified service personnel.

SHARP CORPORATION

SPECIFICATIONS

Convergence	Self Convergence System
Focus	Electro-Static Focusing
Sweep Deflection	Magnetic
Intermediate Frequencies	
Picture IF Carrier	38.9MHz
Sound IF Carrier Frequency	
6.5MHz	32.4MHz
6.0MHz	32.9MHz
5.5MHz	33.4MHz
Colour Sub-Carrier Frequency	34.47MHz
Power Input	110 ~ 240V AC 50/60 Hz
Power Consumption	88W
Audio Power Output Rating	3.0W(rms)x 2
Speaker	
Size	12cm x 6cm Elliptic (2pcs)
Voice Coil Impedance	16 ohms at 400 Hz
Aerial Input Impedance	
VHF/UHF	75 ohms Unbalanced
Receiving System	PAL I, B/G, D/K & SECAM B/G, D/K, K1, & NTSC M
Receiving Channel	
VHF-Channels	E2(48.25MHz) thru E12(224.25MHz) C1(49.75MHz) thru C12(216.25 MHz) S1(105.25MHz) thru S41(463.25HMz)
UHF-Channels	E21(471.25MHz) thru E69(855.25MHz) C13(471.25MHz) thru C57(863.25MHz)
Dimensions	Width: 597mm Height: 468.5mm Depth: 341.5mm Weight(approx): 19.5kg
Cabinet material	All Plastics

Specifications are subject to change without prior notice

IMPORTANT SERVICE NOTES

Maintenance and repair of this receiver should be done by qualified service personnel only.

SERVICE OF HIGH VOLTAGE SYSTEM AND PICTURE TUBE

When servicing the high voltage system, remove static charge from it by Connecting a 10K ohm Resistor in series with an insulated wire(such as a test probe) between picture tube dag and 2nd anode lead. (AC line cord should be disconnected from AC outlet.)

1. Picture tube in this receiver employs integral implosion protection.
2. Replace with tube of the same type number for continued safety .
3. Do not lift picture tube by the neck.
4. Handle the picture tube only when wearing shatterproof goggles and after discharging the high voltage completely.

X-RAY

This receiver is designed so that any X-Ray radiation is kept to an absolute Minimum. Since certain malfunctions or servicing may produce potentially hazardous radiation with prolonged exposure at close range, the following precautions should be observed:

1. When repairing the circuit, be sure not to increase the high voltage to more than 26.0kV (at beam 0 mA) for the set.
2. To keep the set in a normal operation , be sure to make it function on 23.0kV±1.0kV (at beam 1000 mA) in the case of the set. The set has been factory -Adjusted to the above-mentioned high voltage.
   \ If there is a possibility that the high voltage fluctuates as a result of the repairs, never forget to check for such high voltage after the work.
3. Do not substitute a picture tube with unauthorizerd types and/or brands which may cause excess X-ray radiation.

BEFORE RETURNING THE RECEIVER

Before returning the receiver to the user, perform the following safety Checks.

1. Inspect all lead dress to make certain that leads are not pinched or that hardware is not lodged between the chassis and other metal parts in the receiver .
2. Inspect all protective devices such as non-metallic control knobs, insulating fishpapers, cabinet backs, adjustment and compartment covers or shields, isolation resistor- capacity networks, mechanical insulators etc.

ADJUSTMENT PRECAUTIONS

This model's setting are adjusted in two different ways: through the I2C bus control and in the conventional analog manner. The adjustments via the I2C bus control include preset-only items and variable data.

CAUTION : MAKE SURE TV SET IN "NORMAL CONDITION" BEFORE SWITCH TO SERVICE MODE FOR ADJUSTMENT.

1. Setting the service mode by the microprocessor.

(1) Press SERVICE key on the remote controller to set the TV set to SERVICE mode position, and the microprocessor is in input mode. (Adjustment through the I2C bus control). Service Mode also can be reached by by connecting MCU Pin 5 to ground.

(2) Press the MENU key on the remote controller to get ready to select the mode (Adjustment mode, Setting mode, Check mode, Option mode and NVM Edit mode) one by one.

(3) Press the CH DOWN / UP key on the remote controller to select the item in Adjustment mode, Setting mode, Option mode or NVM Edit mode.

(4) Using the VOLUME UP/ DOWN key on the remote controller, the data can be modified. Please wait approximately 200 msec for data storage in EEPROM before select to another mode.

(5) In Check mode the data cannot be changed.

(6) Press the SERVICE key again, it will switch to the NORMAL mode position, and the microprocessor is out of the SERVICE mode.

2. Factory Presetting.

(1) During POWER OFF (AC OFF), switch on service key (by connecting MCU Pin 5 to ground) then follow by AC ON. Initial values are automatically preset only when a new EEPROM is used. (Judge with the first 4 bytes).

(2) The initial data are preset as listed in page 6~10.

(3) Make sure the data need modification or not (Initial data).

Precaution: If haven't done this initialization, it may possibly generate excessive Beam current.

3. For reference please check with memory map RH-IXC688WJZZQ (see attachment)

ADJUSTMENT ITEM

*****Below are the adjustment items that should be done, PLS FOLLOW THE PROCEDURE. Otherwise some adjustment items will not be accurate.**

NO ***	ADJUSTMENT ITEM	EFFECTIVE MODEL	REVISION
1	BUS SET UP	ALL MODELS	
2	RF-AGC		
3	FOCUS ADJ		
4	H-VCO ADJ		
5	VIF-VCO ADJ		
6	S-TRAP ADJ		
7	V-SHIFT		
8	V-SIZE		
9	V-LINEARITY		
10	VS CORRECTION		
11	H-SHIFT		
12	H-SIZE		
13	PARABOLA		
14	UPPER CORNER		
15	LOWER CORNER		
16	BOW-ADJ		
17	ANGLE ADJ		
18	TRAPEZIUM		
19	SCREEN		
20	WHITE BALANCE		
21	SUB-BRIGHTNESS		
22	SUB-CONTRAST		
23	BEAM CURRENT CHECK		
24	SUB-COLOR		
25	SUB-TINT		
26	SECAM-OFFSET		
27	BEAM PROTECTOR CHECK		
28	HV PROTECTOR CHECK		
29	OTHER PROTECTOR CHECK		
30	AV OUT CHECK		
31	AV IN CHECK		
32	COMPONENT IN CHECK		
33	SUB-WOOFER CHECK		
34	CONTRAST CONTROL CHECK		
35	COLOR CONTROL CHECK		
36	BRIGHTNESS CONTROL CHECK		
37	TINT CONTROL CHECK		
38	SHARPNESS CONTROL CHECK		
39	CH DISPLAY COLOR CHECK		
40	SURROUND CHECK		
41	BALANCE CHECK		
42	EQUALIZER CHECK		
43	COLOR TEMP CHECK		
44	NORMAL DISPLAY CHECK		
45	COLOUR SYSTEM CHECK		
46	SOUND SYSTEM CHECK		
47	NOISE MUTE CHECK		
48	OSD LANGUAGE QUANTITY CHECK		
49	SHOCK TEST CHECK		

USER DATA IN SERVICE MODE

. While SERVICE mode ON, EEPROM DATA will switch to the service data.
  Also, once SERVICE mode OFF, EEPROM will switch back to previous USER DATA.
. In the service mode, the user data establish as below,

	USER DATA		MODELS
CONTRAST	MAX	60	ALL MODELS
COLOUR	CENT	0	
BRIGHTNESS	CENT	0	
TINT	CENT	0	
SHARPNESS	CENT	0	
WHITE TEMP	STANDARD		
S-VOLUME	MIN		
SURROUND	OFF		
BALANCE	CENT	0	
AVL	*2		
BLUE BACK	OFF		
C SYSTEM	AUTO		
S SYSTEM	*1		
EQUALIZER	*2		
ANTENNA BOOSTER	*1		

*1: For each CH, data is same as before switch to Service mode.
*2: Data is same as before switch to Serice mode.

The flow of Mode list as following,

* Direct Key-in Mode for Service Items in Service Mode

RC CODE (HEX)	R/C KEY NAME	SERVICE-ITEM
80	POS 1	R-C UP (IN SERVICE MODE V00)
40	POS 2	G-C UP (IN SERVICE MODE V00)
C0	POS 3	B-C UP (IN SERVICE MODE V00)
20	POS 4	R-C DOWN (IN SERVICE MODE V00)
A0	POS 5	G-C DOWN (IN SERVICE MODE V00)
60	POS 6	B-C DOWN (IN SERVICE MODE V00)
E0	POS 7	R-D UP (IN SERVICE MODE V00)
10	POS 8	B-D UP (IN SERVICE MODE V00)
50	POS 0	B-D DOWN (IN SERVICE MODE V00)
E4	FLASHBACK	R-D DOWN (IN SERVICE MODE V00)
E4	FLASHBACK	Y-MUTE (BESIDES OF SERVICE MODE V00)
75	WHITE TEMP UP	RF-AGC (V01)
F5	WHITE TEMP DOWN	VIF-VC0 (V02)
C2	TUNE DOWN	H-VCO (V03)
8D	SHARPNESS DOWN	SUB-CON (V04)
D6	BALANCE LEFT	SUB-COL (V05)
0D	SHARPNESS UP	SUB-BRIGHT (V06)
36	BALANCE RIGHT	SUB-TINT (V07)
46	TREBLE UP	SUB-SHP-PRE (V08)
C6	TREBLE DOWN	SUB-COL-YUV (V09)
26	BASS UP	SUB-TINT-YUV (V10)
24	COLOUR UP	V-SIZE (V11), V-SIZE60 (V16)
54	BRIGHTNESS DOWN	V-SHIFT (V12), V-SHIFT60 (V17)
74	TINT DOWN	H-SHIFT (V13), H-SHIFT60 (V18)
66	SURROUND UP	SCM-BR (V14)
E6	SURROUND DOWN	SCM-BB (V15)
C4	CONTRAST DOWN	SUB-VOL
4C	PICTURE	S-TRAP-BG (V19)
CC	HOLD	S-TRAP-I (V20)
2C	TEXT	S-TRAP-DK (V21)
AC	CANCEL	S-TRAP-M (V22)
EC	SIZE	S-TRAP-574 (V23)
C1		AUTO ADJ FOR V01, V02, V03,V19, V20, V21, V22, V23
CA		T-SET
81		SERVICE MODE

1.) Please set the MCL to **MCL1** as below:

2.) After set the MCL , please set the INITIAL SETTING for each models.

INITIAL 3 : **All Channel Sound System are set to B/G**

MCL1 (HEX AE)		
CH-No	Fv (MHz)	Sound Sys
0		
1	48.25	B/G
2	62.25	B/G
3	77.25	D/K
4	175.25	B/G
5	182.25	B/G
6	183.25	D/K
7	191.25	D/K
8	196.25	B/G
9	199.25	M
10	210.25	B/G
11	224.25	B/G
12	471.25	B/G
13	487.25	I
14	503.25	B/G
15	575.25	B/G
16	583.25	B/G
17	599.25	B/G
18	621.25	M
19	639.25	D/K
20	703.25	B/G
21	735.25	I
22	767.25	B/G
23	815.25	B/G
24	855.25	I
25	855.25	B/G
26	55.25	M
27	83.25	M
28	183.25	M
29	193.25	M
30	217.25	M
31	471.25	M
32	477.25	M
33	693.25	M
34	885.25	M
35	112.25	B/G
36	168.25	B/G
37		
38	294.25	B/G
39	463.25	B/G
40		
41	647.25	B/G
42	663.25	B/G
43	679.25	B/G
44	174.95	B/G
45	175.55	B/G
46		
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SHIPPING SETTING & CHECKING

(1) The following default data has been factory-set for the E2PROM follow by INITIAL DATA selected.

ITEMS	DATA SETTING	MODELS
LAST POWER	ON	ALL MODELS
LAST TV/AV MODE	TV MODE	
LAST POSITION	CH 1	
FLASHBACK CHANNEL	CH 1	
1/2 DIGIT ENTRY	2 DIGIT ENTRY	
VOLUME	0 (Min)	
BLUE BACK	OFF	
CHILD LOCK	OFF	
OFF TIMER	--:--	
PASSWORD	0000	
AFT	ALL CH ON	
COLOR SYSTEM	ALL CH AUTO	
SKIP	ALL CH OFF	
FAVORITE PROGRAM A	CH 10	
FAVORITE PROGRAM B	CH 20	
FAVORITE PROGRAM C	CH 30	
FAVORITE PROGRAM D	CH 40	
AV MODE	MOVIE	
CONTRAST	60	
COLOR	+3	
BRIGHTNESS	0	
TINT	0(CENTER)	
SHARPNESS	+3	
PICTURE NR	OFF	
WHITE TEMP	0	
SURROUND	OFF	
AVL	ON	
BALANCE	0(CENTER)	
SAVE MODE	OFF	
BOOSTER	ALL CH OFF	

INITIAL	LANGUAGE	SOUND SYSTEM
3	ENGLISH	B/G

FACTORY SETTING BY MODEL

(Reference: Geomagnetism Adjustment)

MODEL	MAGNETIC FIELD(V, H) nT		BACKGROUND	LANG.	S-SYS	LANG QTY
INDONESIA	-20,000	40,000	12300°K	ENGLISH	B/G	1

1: ENGLISH

**AFTER INITIALIZED THE EEPROM (REFER TO FACTORY PRESETTING), READ DATA FROM EEPROM ADDRESS 00H ~ 03H,AND COMPARE TO THE LIST BELOW, IF DIFFERENT, INITIALIZE THE EEPROM.

ADDRESS	DATA	ADDRESS	DATA
00H:	**7CH**	02H:	**78H**
01H:	**76H**	03H:	**78H**

*** There are four stages of service mode data. First stage data from V00~V45 (Adjustment Mode).
To go into second stage of service mode data, press MENU key.Second stage data from F01~F170(Setting Mode).
To go into third stage of service mode data, press MENU key.Third stage data is Check Mode.
To go into fourth stage of service mode data, press MENU key.Fourth stage data from O01~O35 (Option Mode).

Adjustment Mode (First Stage)

EEPROM ITEMS	OSD	DATA LENGTH	INITIAL DATA	SETTING DATA 21DXS200	FIX/ADJ/AUTO	REMARK
R-DRI	V00	0…127	63	63	ADJ	
B-DRI	V00	0…127	63	63	ADJ	PLS REFER ADJ ITEM
R-CUT	V00	0…255	127	127	ADJ	SCREEN AND WHITE
G-CUT	V00	0…255	127	127	ADJ	BALANCE
B-CUT	V00	0…255	127	127	ADJ	
RF-AGC	V01	0…127	50	50	AUTO	
VIF-VCO	V02	0…63	31	31	AUTO	
H-VCO	V03	0…7	3	3	AUTO	
SUB-CON	V04	0…127	100	100	ADJ	
SUB-COLOR	V05	0…127	63	63	ADJ	
SUB-BRIGHT	V06	0…255	127	127	ADJ	
SUB-TINT	V07	0…127	63	63	ADJ	
SUB-SHP PRE	V08	0…63	37	28	*FIX	
SUB-COLOR-YUV	V09	0…127	49	49	FIX	
SUB-TINT-YUV	V10	0…127	61	61	FIX	
V-SIZE	V11	0…63	38	38	ADJ	
V-SHIFT	V12	0…7	3	3	ADJ	
H-SHIFT	V13	0…31	9	9	ADJ	
SCM-BR	V14	0…63	37	37	ADJ	
SCM-BB	V15	0…63	22	22	ADJ	
V-SIZE60	V16	-31…0…+31	+6	+6	FIX	
V-SHIFT60	V17	-7…0…+7	-2	-2	FIX	
H-SHIFT60	V18	-15…0…+15	+2	+2	FIX	
S-TRAP(BG)	V19	0…127	64	64	AUTO	
S-TRAP(I)	V20	0…127	64	64	AUTO	
S-TRAP(DK)	V21	0…127	64	64	AUTO	
S-TRAP(M)	V22	0…127	64	64	AUTO	
S-TRAP(574)	V23	0…127	64	64	AUTO	
TEST PATTERN	V24	0…15	0	0	FIX	
S-TRAP ADJ Start	V25	0…127	25	25	FIX	
S-TRAP ADJ Stop	V26	0…127	95	95	FIX	
VS-CORRECT	V27	0…63	38	38	*FIX	**ADJUST IF NECESSA**
VS-CORRECT60	V28	-13…+13	-9	-9	FIX	
V LINEARITY	V29	0…63	36	36	*FIX	**ADJUST IF NECESSA**
V LINEARITY60	V30	-13…+13	+3	+3	FIX	
SUB-SHP OV	V31	0…63	26	26	FIX	
PARABOLA	V32	0…63	32	32	ADJ	
PARABOLA60	V33	-13…+13	0	0	FIX	
TRAPEZIUM	V34	0…63	32	32	ADJ	
TRAPEZIUM60	V35	-13…+13	0	0	FIX	
H-SIZE	V36	0…63	32	32	ADJ	
H-SIZE60	V37	-13…+13	0	0	FIX	
UPPER-CORNER	V38	0…63	32	32	ADJ	
UPPER-CORNER60	V39	-13…+13	0	0	FIX	
LOWER-CORNER	V40	0…63	32	32	ADJ	
LOWER-CORNER60	V41	-13…+13	0	0	FIX	
ANGLE ADJ	V42	0…63	32	32	ADJ	
ANGLE ADJ60	V43	-13…+13	0	0	FIX	
BOW ADJ	V44	0…63	32	32	ADJ	
BOW ADJ60	V45	-13…+13	0	0	FIX	

Setting Mode (Second Stage)

EEPROM ITEMS	OSD	DATA LENGTH	INITIAL DATA	SETTING DATA 21DXS200	FIX/ADJ/AUTO
ABCL-Gain	F01	0 (Lo)/ 1(Hi)	0	0	FIX
VIF-G	F02	0…7	7	7	FIX
YDL	F03	0…7	5	5	FIX
YDL-P	F04	0…7	5	5	FIX
YDL-S	F05	0…7	6	6	FIX
YDL-N4	F06	0…7	5	5	FIX
YDL-N3	F07	0…7	5	5	FIX
YDL-AV	F08	0…7	5	5	FIX
YDL-AV-P	F09	0…7	5	5	FIX
YDL-AV-S	F10	0…7	5	5	FIX
YDL-AV-N4	F11	0…7	5	5	FIX
YDL-AV-N3	F12	0…7	5	5	FIX
YDL-YUV	F13	0…7	5	5	FIX
COL-AV	F14	-31…0…+31	-4	-4	FIX
COL-P	F15	-31…0…+31	+12	+12	FIX
COL-S	F16	-31…0…+31	+9	+9	FIX
COL-N4	F17	-31…0…+31	+8	+8	FIX
COL-N3	F18	-31…0…+31	+12	+12	FIX
COL-ADJ	F19	-31…0…+31	+8	+8	FIX
SHP-PRE-AV	F20	-31…0…+31	+1	+1	FIX
SHP-PRE-YUV	F21	-31…0…+31	+3	+3	FIX
SHP-PRE-P	F22	-31…0…+31	+7	+7	FIX
SHP-PRE-S	F23	-31…0…+31	+2	+2	FIX
SHP-PRE-N4	F24	-31…0…+31	+7	+7	FIX
SHP-PRE-N3	F25	-31…0…+31	+7	+7	FIX
SHP-OV-AV	F26	-31…0…+31	-5	-5	FIX
SHP-OV-YUV	F27	-31…0…+31	+13	+13	FIX
SHP-OV-P	F28	-31…0…+31	+7	+7	FIX
SHP-OV-S	F29	-31…0…+31	+2	+2	FIX
SHP-OV-N4	F30	-31…0…+31	+7	+7	FIX
SHP-OV-N3	F31	-31…0…+31	+7	+7	FIX
TINT-AV	F32	-63…0…+63	-5	-5	FIX
TINT-ADJ	F33	-63…0…+63	+3	+3	FIX
R-R	F34	-63…0…+63	+5	+5	FIX
B-R	F35	-63…0…+63	-19	-19	FIX
R-B	F36	-63…0…+63	-2	-2	FIX
B-B	F37	-63…0…+63	+8	+8	FIX
CTRAP-ADJ	F38	0…3	2	2	FIX
CTRAP-ADJ-P	F39	0…3	2	2	FIX
CTRAP-ADJ-S	F40	0…3	2	2	FIX
CTRAP-ADJ-N4	F41	0…3	2	2	FIX
CTRAP-ADJ-N3	F42	0…3	1	1	FIX
AFC2 GAIN	F43	0…3	1	1	FIX
GAMMA	F44	0…3	3	3	FIX
BS-D/C	F45	0…15	4	4	FIX
BS-GAIN	F46	0…2	0	0	FIX

OM-DET	F47	0 (disable)/ 1(enable)	0	0	FIX
SL-TV	F48	0…7	1	1	FIX
SL-AV	F49	0…7	2	2	FIX
SL-YUV	F50	0…7	3	3	FIX
AS/FBP-TV	F51	0…3	3	3	FIX
AS/FBP-AV	F52	0…3	3	3	FIX
AS/FBP-YUV	F53	0…3	3	3	FIX
VDL	F54	0…3	0	0	FIX
UDL	F55	0…3	0	0	FIX
AUTO-SCM-KIL-TV	F56	0…3	1	1	FIX
SECAM-BGP	F57	0…3	0	0	FIX
OSD-POS-V50	F58	1…55	42	42	FIX
OSD-POS-V60	F59	1…50	35	35	FIX
OSD-POS-H	F60	0…127	15	19	*FIX
CP	F61	0/1	1	1	FIX
AVL LEVEL	F62	0,0 : 600mVrms 0,1 : 450mVrms 1,0 : 375mVrms 1,1 : 300mVrms	1	3	*FIX
AUTO-SCM-KIL-AV-YUV	F63	0…3	1	1	FIX
AFC1-Gain-TV	F64	0…3	0	0	FIX
AFC1-Gain-AV	F65	0…3	3	3	FIX
AFC1-Gain-YUV	F66	0…3	3	3	FIX
OSD LEVEL	F67	0 : 10% 1 : 30% 2 : 50% 3 : 70% 4 : 90%	3	3	FIX
Take-Off-TV	F68	0 (BPF)/ 1(TOF)	1	1	FIX
Take-Off-AV-YUV	F69	0 (BPF)/ 1(TOF)	0	0	FIX
C-Angle	F70	0 (103)/ 1(95)	0	0	FIX
AC-Fail-WO-Bright	F71	0…255	255	255	FIX
Forced-SCM-KIL-TV	F72	0…3	2	2	FIX
Forced-SCM-KIL-AV-YUV	F73	0…3	2	2	FIX
V-Demute-Delay	F74	0…255	25	25	FIX
S-Demute-Delay	F75	0…255	40	40	FIX
MER	F76	0…255	70	70	FIX
MEL1	F77	0…255	150	150	FIX
MEL2	F78	0…255	156	156	FIX
MEL3	F79	0…255	163	163	FIX
MEL4	F80	0…255	165	165	FIX
MEL5	F81	0…255	170	170	FIX
MEL6	F82	0…255	180	180	FIX

S-St-Point	F83	0…60	21	21	FIX
S-Sp-Point	F84	0…60	60	60	FIX
S-Step	F85	0…60	7	7	FIX
Pow-Storage	F86	0 (disable)/ 1(enable)	1	1	FIX
S-B-BASS	F87	0 … +10	10	10	FIX
S-B-TREB	F88	0 … +10	10	10	FIX
S-BASS	F89	0 … +10	10	10	FIX
S-TREB	F90	0 … +10	10	10	FIX
SIF AGC GAIN DOWN	F91	0/1	1	1	FIX
SIF BPF WIDE HIGH	F92	0/1	0	0	FIX
SIF BPF WIDE LOW	F93	0/1	0	0	FIX
APER-FREQ	F94	0/1	0	0	FIX
R-DRI YUV OFFSET	F95	-63…0…+63	0	0	FIX
B-DRI YUV OFFSET	F96	-63…0…+63	0	0	FIX
R-CUT YUV OFFSET	F97	-63…0…+63	-12	-12	FIX
G-CUT YUV OFFSET	F98	-63…0…+63	-5	-5	FIX
B-CUT YUV OFFSET	F99	-63…0…+63	0	0	FIX
CON YUV OFFSET	F100	-63…0…+63	+2	+2	FIX
BRT YUV OFFSET	F101	-63…0…+63	+4	+4	FIX
SHP ANT-ONII OFFSET	F102	-31…0…+31	0	-20	*FIX
WAIT MD TIME	F103	0..2	2	2	FIX
Contrast OFFSET	F104	-63…0…+63	0	-16	*FIX
Bright OFFSET	F105	-63…0…+63	0	0	FIX
CR-PEDESTEL-ADJ	F106	0…15	5	5	FIX
CB-PEDESTEL-ADJ	F107	0…15	5	5	FIX
R MTX UP	F108	0/1	1	1	FIX
MATRIX ADJ	F109	0…3	0	0	FIX
AV2 Brightness OFFSET	F110	-15…0…+15	-4	-4	FIX
BASS OFFSET	F111	-4…0…+4	0	0	FIX
MID1 OFFSET	F112	-4 … +4	0	-1	*FIX
MID2 OFFSET	F113	-4 … +4	0	0	FIX
MID3 OFFSET	F114	-4 … +4	-2	0	*FIX
TREBLE OFFSET	F115	-4…0…+4	-1	+1	*FIX
AS-SPEED (DOWN/UP)	F116	0…3	0	0	FIX
SIF-BPF-WIDE	F117	0…7	3	3	FIX
SIF-BPF-WIDE-574	F118	0…7	0	0	FIX
CONT NEWS	F119	0..60	55	55	FIX
CONT MUSIC	F120	0..60	60	60	FIX
CONT MOVIE	F121	0..60	60	60	FIX
BRIGHT NEWS	F122	-30..0..+30	0	0	FIX
BRIGHT MUSIC	F123	-30..0..+30	0	0	FIX
BRIGHT MOVIE	F124	-30..0..+30	0	0	FIX
COL NEWS	F125	-30..0..+30	0	0	FIX
COL MUSIC	F126	-30..0..+30	0	0	FIX
COL MOVIE	F127	-30..0..+30	+3	+3	FIX
SHARP NEWS	F128	-30..0..+30	0	0	FIX
SHARP MUSIC	F129	-30..0..+30	0	0	FIX
SHARP MOVIE	F130	-30..0..+30	+3	+3	FIX
SURR NEWS	F131	0(OFF) / 1(ONI) / 2(ONII)	0	0	FIX
SURR MUSIC	F132	0(OFF) / 1(ONI) / 2(ONII)	0	0	FIX
SURR MOVIE	F133	0(OFF) / 1(ONI) / 2(ONII)	0	0	FIX

EQ BASS NEWS	F134	-10..0..+10	-1	0	*FIX
EQ BASS MUSIC	F135	-10..0..+10	+1	+4	*FIX
EQ BASS MOVIE	F136	-10..0..+10	+1	+4	*FIX
EQ MID1 NEWS	F137	-10..0..+10	+1	0	*FIX
EQ MID1 MUSIC	F138	-10..0..+10	0	-1	*FIX
EQ MID1 MOVIE	F139	-10..0..+10	-1	-2	*FIX
EQ MID2 NEWS	F140	-10..0..+10	0	+2	*FIX
EQ MID2 MUSIC	F141	-10..0..+10	-3	-3	FIX
EQ MID2 MOVIE	F142	-10..0..+10	-1	-1	FIX
EQ MID3 NEWS	F143	-10..0..+10	+1	+1	FIX
EQ MID3 MUSIC	F144	-10..0..+10	0	-2	*FIX
EQ MID3 MOVIE	F145	-10..0..+10	+1	-2	*FIX
EQ TRE NEWS	F146	-10..0..+10	-1	0	*FIX
EQ TRE MUSIC	F147	-10..0..+10	+5	+2	*FIX
EQ TRE MOVIE	F148	-10..0..+10	+3	+1	*FIX
S-BOOST NEWS	F149	0(OFF) / 1(ON)	0	0	FIX
S-BOOST MUSIC	F150	0(OFF) / 1(ON)	1	1	FIX
S-BOOST MOVIE	F151	0(OFF) / 1(ON)	1	1	FIX
R-R-C	F152	-63...0...+63	+4	+4	FIX
B-R-C	F153	-63...0...+63	-5	-5	FIX
R-B-C	F154	-63...0...+63	-1	-1	FIX
B-B-C	F155	-63...0...+63	+6	+6	FIX
TRE OFFSET SUR ONII	F156	-7 ~ 0 +7	+1	+1	FIX
VD3 / VD2 / VD1-TV	F157	0...7	1	1	FIX
VD3 / VD2 / VD1-AV-YUV	F158	0...7	3	3	FIX
CORNER UP-LOW ENABLE	F159	0/1	1	1	FIX
BOW/ANGLE ENABLE	F160	0(OFF)/1(ON)	1	1	FIX
SHP-NR-OFFSET	F161	-15...0	0	0	FIX
RGB MUTE TIME	F162	0...8	1	1	FIX
H-BLK LEFT	F163	0...7	0	0	FIX
H-BLK RIGHT	F164	0...7	3	3	FIX
FRONT-DET	F165	0(no Front-det) 1(Front-det)	0	0	FIX
SURROUND	F166	0(1-CHIP) 1(SHAKIT)	0	0	FIX
AUTO SCM-BR OFFSET	F167	-31...0...+31	0	0	FIX
AUTO SCM-BB OFFSET	F168	-31...0...+31	0	0	FIX
GLARE/SAVE MODE OFFSET	F169	0...63	30	30	FIX
H-STOP DELAY	F170	0 : 5ms 1 : 10ms 2 : 15ms 3 : 20ms	1	1	FIX

Option Mode (Fourth stage)					Setting data
Data	OPTION FUNCTION	Description	Range	Default Data	21DXS200
O01	***HTL	OFF/ON	0/1	0	0
O02	***HTL-POS	Pos-No,Nil	0…99,--	--	--
O03	***HTL-VOL	Vol-Lvl, Nil	0…60,--	--	--
O04	HTL-MENU KEY	Dis/Ena MENU key in HTL mode	0/1	1	1
O05	COL-SYSTEM	0: PAL only 1: 18-system 2: 21-system	0…2	2	2
O06	Force-Col	Dis/Ena	0/1	0	0
O07	S-SYS	M/DK/I/BG	1…15	15	15
O08	AV	0: No AV 1: AV 2: AV1/AV2	0…2	2	2
O09	YUV	0 : without COMPONENT 1 : COMPONENT (share with AV1) 2 : COMPONENT (individual)	0…2	2	1
O10	S-CTRL	0 : without SOUND-MENU 1 : TONE 2 : EQUALIZER	0…2	2	2
O11	BIL	Dis/Ena	0/1	0	0
O12	LANG	*/*/A/M/R/F/*/E	1…255	61	1
		/V//M/*/F/C/E	1…255	87	
		//*/*/*/*/T/E	1…255	3	
O13	SERCH-SP	350/450/550/650/750	1…5	3	5
O14	R/C-MENU	Ena/Dis	0/1	0	0
O15	LED-CONT	One LED/ Two LEDs	0/1	0	0
O16	S-BOOSTER	0: No S-BOOSTER 1: Using DAC IC 2: Using PWM port	0…2	0	0
O17	VOL CURVE	Dis/Ena	0/1	0	1
O18	**TUNER BAND	Refer to Table 1	0/1	0	0
O19	WHITE BACK	Dis/Ena	0/1	1	0
O20	BOOSTER	Dis/Ena	0/1	0	1
O21	250 CHANNEL	0 : 100 channels(8k EEPROM) 1 : 250 channels(16k EEPROM)	0/1	0	0

O22	AVL	0 : fix to 0 1 : fix to 1 2 : AVL in SOUND MENU	0…2	2	2
O23	LNA TUNER	0 : ALPS 1 : MATSUSHITA	0/1	0	1
O24	NORMAL KEY	Set items to default for 0 : Picture and Sound 1 : Picture only	0/1	0	0
O25	AV MODE	Dis/Ena	0/1	1	1
O26	MP-IN	Dis/Ena	0/1	1	0
O27	VIRGIN-MODE	Dis/Ena	0/1	0	0
O28	WHITE-TEMP	0 : 3 modes 1 : 5 modes	0/1	0	0
O29	LK MENU	Dis/Ena	0/1	0	0
O30	ARROW-KEY	0 : CH △/▽, VOL+/- 1 : /, /*%	0/1	1	1
O31	VOL-TABLE	0 : 7-bit volume table 1 : 8-bit volume table	0/1	0	0
O32	GLARE/SAVE MODE	0: No GLARE/SAVE MODE 1: GLARE MODE 2: SAVE MODE	0…2	1	2
O33	LANGUAGE PACKAGE	0 : 5-language(E/M/F/R/A) 1 : Vietnam(E/M/F/C/V)	0/1	0	0
O34	CONTRAST TABLE	0 : (-105~0) contrast table 1 : (-60~0) contrast table 2: (-30 ~ 0) contrast table	0…2	0	0
O35	BRIGHTNESS TABLE	0: (-60 ~ +60) brightness table 1: (-30 ~ +30) brightness table	0/1	0	0

*** HOTEL MODE
OPERATION OF HOTEL MODE:
WHEN CHANGE SERVICE DATA O01 TO 1, HOTEL MODE IS ON
WHEN HOTEL MODE IS ON,

1. Max volume data is determined by option setting HTL-VOL (O03)
2. Channel position after POWER ON is determined by option setting HOTEL-POS (O02) (if option setting HOTEL-POS is not set, processing is according to last position data).
3. User data updates of EEPROM regarding the video and audio control is not allowed.
4. Preset mode is disable.
5. CH SETTING menu is not available.

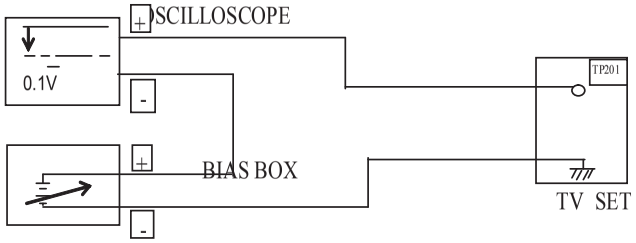
* *TUNER BAND

P-Freq	BAND	
	TUNER BAND = 0 (same as GA6)	TUNER BAND = 1
41.10MHz ~ 122.10MHz	VHF-L (0001)	VHF-L (0001)
122.15MHz ~ 143.10MHz		VHF-H (0010)
143.15MHz ~ 362.10MHz	VHF-H (0010)	
362.15MHz ~ 426.10MHz		UHF (1000)
426.15MHz ~ 871.10MHz	UHF (1000)	

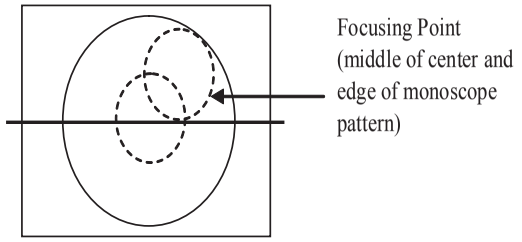
TABLE 1

ADJUSTMENT PRECAUTION : Make sure TV Set is in "NORMAL CONDITION" before switch to Service Mode for Adjustment.

PIF ADJUSTMENT CHECKING

NO	ADJUSTMENT POINT	ADJUSTMENT CONDITION / PROCEDURE	WAVEFORM OR OTHERS
1	RF-AGC TAKE OVER POINT ADJUSTMENT (I2C BUS CONTROL) **(AUTO & MANUAL ADJ)**	(1) Receive "PAL COLOR BAR" signal. Signal Strength: **refer to *Note 1** (2) Connect the oscilloscope to TP201 (Tuner's AGC Terminal) as shown in figure 3-1.  Bias Box : about 4.5V Fig. 3-1 (3) Call "**V01**" mode in service mode. Adjust the "**V01**" bus data to obtain the Tuner output pin drop **0.1~1.0V** below maximum voltage. (4) Change the antenna input signal to ***Note 1**, and make sure there is no noise. (5)Turn up the input signal to 90 ~ 95 dBμV to be sure that there is no cross modulation beat.	***** for Auto ADJ** 1)Receive "PAL COLOR BAR" signal signal strength : **refer to *Note 1** 1) Go to service mode. 2) Go to service data V01, press R/C to operate auto key (Hex C1) and confirm the 'OK' display on the screen. 3) If appear NG, increase data some step and pls repeat step 2. 4) Proceed step 4 & 5 in manual mode. ***Note 1** Model / Signal Strength / Antenna Input Signal **21DXS200** / 56 ± 1dBμV (75 open) / 63 ~ 67dBμV

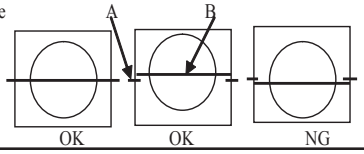
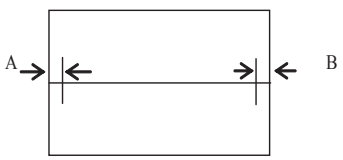
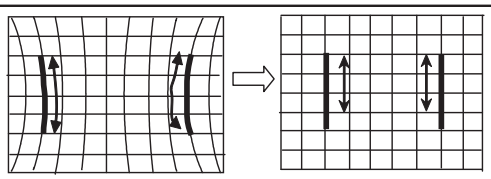
FOCUS ADJUSTMENT

NO	ADJUSTMENT POINT	ADJUSTMENT CONDITION / PROCEDURE	WAVEFORM OR REMARKS
1	FOCUS	(1) Receive the "Monoscope Pattern" signal. (2) Press RESET to set Picture NORMAL condition. (3) Adjust the focus control to get the best focusing.	

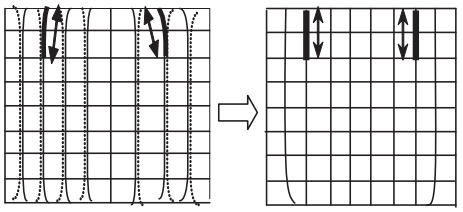
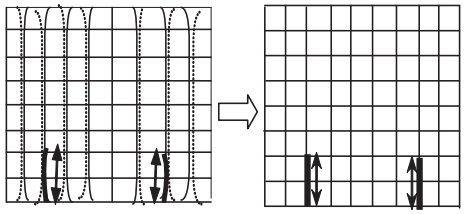
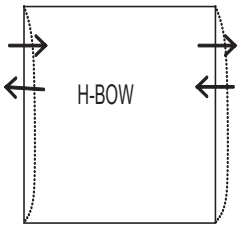
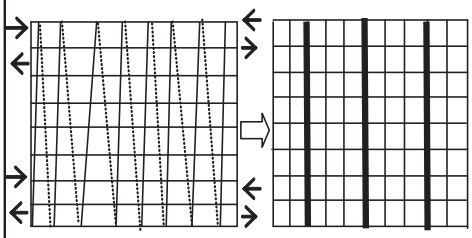
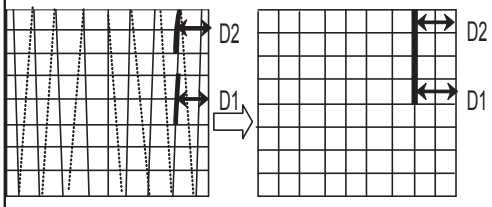
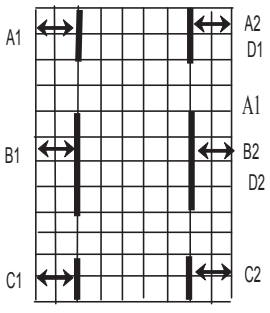
H-VCO, VIF-VCO & S-TRAP fo ADJUSTMENT

NO	ADJUSTMENT POINT	ADJUSTMENT CONDITION / PROCEDURE	WAVEFORM OR OTHERS
1	H-VCO ADJ (I2C BUS CONTROL) **(AUTO & MANUAL ADJ)**	**(Manual Adj)** (1) In No signal (RASTER) condition. (2) Go to service mode, choose service data **V03**. (3) Connect oscilloscope to **IC801 pin13 (H-OUT)**, adj **V03** until freq become **15.625 ± 0.15 KHz.** **(Auto Adj)** (1) In No signal (RASTER) condition. (2) Go to service mode. (3) Choose service data **V03**, by pressing R/C **Auto (Hex C1)** key, OSD will appear "OK" at screen. (4) If appear "NG" pls repeat step 3.	
2	VIF-VCO ADJ (I2C BUS CONTROL) **(AUTO & MANUAL ADJ)**	**(Manual Adj)** (1) In No signal (RASTER) condition. (2) Go to service mode, choose service data **V02.** (3) Connect oscilloscope to **IC801 pin7 (AFT)**, adj **V02** until voltage become **2.5 ± 1 V.** **(Auto Adj)** (1) In No signal (RASTER) condition. (2) Go to service mode, choose service data **V02.** (3) Press the R/C **Auto (Hex C1)** key, OSD will appear "OK" at screen. (4) If appear "NG" pls repeat step 3.	*NOTE: This adjustment must be done after aging at least 3 minutes.
3	S-TRAP fo ADJ (I2C BUS CONTROL) **(AUTO & MANUAL ADJ)**	(**Manual ADJ**) (1) In No signal (RASTER) condition. (2) Go to service mode, choose service data **V20.** (3) Connect oscilloscope to **TP 801**, adj **V20** until voltage become **Min** (below 5 V). (4) After that pls adj service data **V19& V23 same as "V20", V21 to "V20+ 1", V22 to "V20-2".** (**Auto Adj**) (1) In No signal (RASTER) condition. (2) Go to service mode, choose service data **V20 (S-TRAP I).** (3) Press the R/C **Auto (Hex C1)** key, OSD will appear "OK" at screen. (4) If appear "NG" pls repeat step 3.	

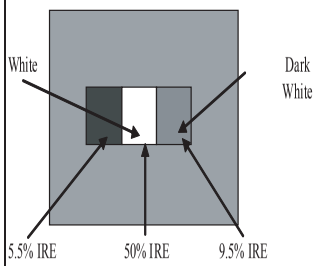
HORIZONTAL ,VERTICAL,DEFLECTION LOOP ADJUSTMENT (1)

NO	ADJUSTMENT POINT	ADJUSTMENT CONDITION / PROCEDURE	WAVEFORM OR OTHERS
1	V-SHIFT (I2C BUS CONTROL)	(1) Receive Monoscope Pattern Signal (PAL 50 Hz). (2) Choose the service data **V12**. (3) Adjust **V12** to align the center of the screen to the geometric center of CRT. **Note: B line (Monoscope middle line) must same or nearest higher position to the A mark (Tube middle mark),refer to the attach drawing.**	Figure 
2	V-SIZE (I2C BUS CONTROL) **(to be done after V-shift adj)**	(1) Receive Monoscope Pattern Signal (PAL 50 Hz). (2) Choose the service data **V11**. (3) Adjust **V11** bus data until the overscan become **10 ± 1.5 %.** **Caution 1: Pls aging TV more than 10 minutes before adjustment**	
3	V-LINEARITY (I2C BUS CONTROL)	(1) Receive Monoscope Pattern Signal (PAL 50 Hz). (2) Choose the service data **V29**. (3)Already preset. (Adjust this unless the linearity is not achieved.)	
4	VS CORRECTION (I2C BUS CONTROL)	(1) Receive Monoscope Pattern Signal (PAL 50 Hz). (2) Choose the service data **V27**. (3)Already preset. (Adjust this unless the linearity is not achieved.)	
5	H-SHIFT (I2C BUS CONTROL)	(1) Receive Monoscope Pattern Signal (PAL 50 Hz). (2) Choose the service data **V13**. (3) Adjust the **V13** bus data to have a balance position to spec of **A=B** (as attach drawing). (4) If cannot make it to **A=B**, adjust from the best point so that **A** slightly smaller than **B**.	
6	H-SIZE (I2C BUS CONTROL)	(1) Receive Monoscope Pattern Signal (PAL 50 Hz). (2) Choose the service data **V36** (3) Adjust **V36** bus data until the overscan becomes **10 ± 1.5 %.**	
7	PARABOLA (I2C BUS CONTROL)	(1) Receive CrossHatch Pattern Signal (PAL 50Hz). (2) Choose the service data **V32** Adjust the 2nd vertical line from the right end of the crosshatch pattern so that the middle 4 blocks are straight. (3) Make sure both left / right of 2nd vertical line at optimum point	

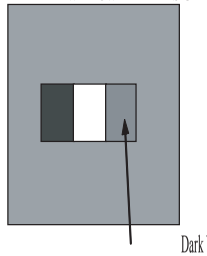
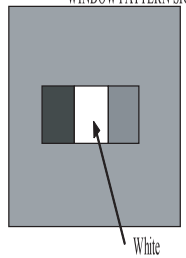
HORIZONTAL , VERTICAL DEFLECTION LOOP ADJUSTMENT (2)

NO	ADJUSTMENT POINT	ADJUSTMENT CONDITION / PROCEDURE	WAVEFORM OR OTHERS
8	UPPER CORNER (I2C BUS CONTROL)	(1) Receive CrossHatch Pattern Signal (PAL 50 Hz). (2) Choose the service data **V38** (3) Adjust the 2nd upper vertical line from the right end of the crosshatch pattern so that the upper line are straight. (4) Make sure both left / right of 2nd vertical line at optimum point	
9	LOWER CORNER (I2C BUS CONTROL)	(1) Receive CrossHatch Pattern Signal (PAL 50 Hz). (2) Choose the service data **V40** (3) Adjust the 2nd lower vertical line from the right end of the crosshatch pattern so that the bottom line are straight. (4) Make sure both left / right of 2nd vertical line at optimum point	
10	BOW-ADJ (I2C BUS CONTROL)	(1) Receive CrossHatch Pattern Signal (PAL 50 Hz). (2) Choose the service data **V44 BOW ADJ** (3) Adjust the 2nd vertical line from the end of the crosshatch pattern until line is straight	
11	ANGLE ADJ (I2C BUS CONTROL)	(1) Receive CrossHatch Pattern Signal (PAL 50 Hz). (2) Choose the service data **V42** (3) Adjust the 2nd vertical line from the end of the crosshatch pattern line is straight (4) Make sure both left / right of 2nd vertical line at optimum point	
12	TRAPEZIUM (I2C BUS CONTROL)	(1) Receive CrossHatch Pattern Signal (PAL 50 Hz). (2) Choose the service data **V34** (3) Adjust the 2nd vertical line from the right end of the crosshatch pattern so that the D1 (center area of the second vertical line - edge of screen) and D2 (top area of the second vertical line - edge of screen) are same. (4) Make sure both left / right of 2nd vertical line at optimum point	
13	FINAL INSPECTION OF ADJUSTMENT	(1) Receive CrossHatch Pattern Signal (PAL 50Hz). (2) Please make sure picture distortion (overall picture quality) must be balance at optimum point TOP / BOTTOM at LEFT / RIGHT corner. (3) If NG, please RE-ADJUST follow step 7 to 13 or adjust at NG position to get best picture quality	 A1≈ A2 B1≈ B2 C1≈ C2 D1 = D2 OVERALL PICTURE QUALITY MUST BE BALANCE AT OPTIMUM POINT (LEFT & RIGHT)

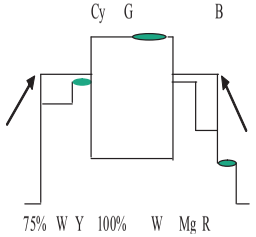
SCREEN, WHITE BALANCE, SUB-BRIGHTNESS & SUB-CONTRAST ADJUSTMENT (1)

NO	ADJUSTMENT POINT	ADJUSTMENT CONDITION / PROCEDURE	WAVEFORM OR OTHERS
1	SCREEN ADJUSTMENT (I2C BUS CONTROL)	(1) In window pattern signal condition (2) Go to service mode, then select V00. (3) By pressing R/C key **S-Mute (Hex E8)**, **R-D** auto switch to **63**, **B-D** auto switch to **63**, **R-C** auto switch to **127**, **G-C** auto switch to **127**, **B-C** auto switch to **127**, **Sub-brightness V06** auto switch to **127.** Y-mute & Vertical off, screen will be in **vertical cut-off** condition (4) Adjust the Screen so that cut-off line appear in low bright, then judge that whether the cut-off line appear in Red or Green or Blue color, in this condition between R-C & G-C & B-C, fix the data of the color appear in cut-off line and adj the other two cut-off data (Note 1) so that cut-off line color become white. (5)Turn the screen VR of FBT so that cut-off line just **disappear** and use R/C by pressing key **S-Mute (Hex E8)** to **disable** the Y-mute & V-cut so that picture appear in normal mode.	Note 1: R-CUTOFF (R-C) UP RC key "1" (HEX 80) R-CUTOFF (R-C) DOWN RC key "4" (HEX 20) G-CUTOFF (G-C) UP RC key "2" (HEX 40) G-CUTOFF (G-C) DOWN RC key "5" (HEX A0) B-CUTOFF (B-C) UP RC key "3" (HEX C0) B-CUTOFF (B-C) DOWN RC key "6" (HEX 60) R-DRIVE (R-D) UP RC key "7" (HEX E0) R-DRIVE (R-D) DOWN RC key "Flashback" (HEX E4) B-DRIVE (B-D) UP RC key "8" (HEX 10) B-DRIVE (B-D) DOWN RC key "0" (HEX 50)
2	WHITE BALANCE ADJ **(to be done after screen adj)** (I2C BUS CONTROL)	**(1)WHITE (HIGH BEAM)** (In Window Pattern Signal) First use Minolta Color Analyzer CA100, let the gun point at **Dark White** position (as drawing attach), Adj **V06** until **LUMINANCE Y** become **4 cd/m2**, then let the gun point at **White** position (as drawing attach), Adj **V04** until **LUMINANCE Y** become: **150 cd/m2.** In service mode V00, adj the **R-D** & **B-D** until the axis of color temperature become **12300°K X : 0.272 , Y : 0.275** **(2) DARK WHITE (LOW BEAM)** (In Window Pattern Signal) Let the gun point at **Dark White** position, if the color temperature data shift away from the data adjusted in **step 1**, adjust **R-C, G-C & B-C but between them, first color appears in Screen adj item (4) is fixed**, adj the other two so that to obtain the similar axis as above. **** Repeat step 1 & 2 to get a regulated position**	WINDOW PATTERN SIGNAL  ***Note :** Signal using W/B Pattern Generator SX-1006 (IWATSU) or equivalent. Window Pattern Signal output level are as above:

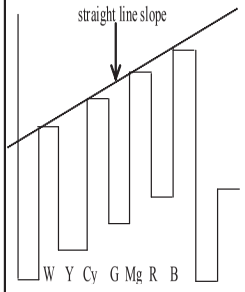
SCREEN, WHITE BALANCE, SUB-BRIGHTNESS & SUB-CONTRAST ADJUSTMENT (2)

NO	ADJUSTMENT POINT	ADJUSTMENT CONDITION / PROCEDURE	WAVEFORM OR OTHERS
3	SUB-BRIGHTNESS **(to be done after screen, white balance adj)** (I2C BUS CONTROL)	(1) In Window Pattern Signal condition. (2) Using Minolta Color Analyzer CA-100, let the gun point at **Dark White** position (as attach drawing), adjust **V06** Bus data until **LUMINANCE Y = 4 cd/m2** | Service Mode	Luminance (cd/m2)	Tolarance (cd/m2) Upper Limit	Lower Limit
Enable	4.0	+0.5	-0.5
Disable	4.0	+1.5	-0.5		WINDOW PATTERN SIGNAL 
4	SUB-CONTRAST **(to be done after screen, white balance adj, sub-brightness adj)** (I2C BUS CONTROL)	(1) In Window Pattern Signal condition. (2) Using Minolta Color Analyzer CA-100, let the gun point at **White** position (as attach drawing), adjust **V04** Bus data until **LUMINANCE Y = 150cd/m2** | Service Mode	Luminance (cd/m2)	Tolarance (cd/m2) Upper Limit	Lower Limit
Enable	150.0	+10	-10
Disable	150.0	+10	-10		WINDOW PATTERN SIGNAL 
5	BEAM CURRENT CHECK	(1) Receive the "Monoscope Pattern" signal. (2) Press R/C to set Picture NORMAL condition. (3) Connect the DC miliammeter between TP 603 (+) & TP 602 (-) (Full Scale: 3mA Range). (4) Beam current must be within : **1000 ± 100µA**	

PAL CHROMA ADJUSTMENT

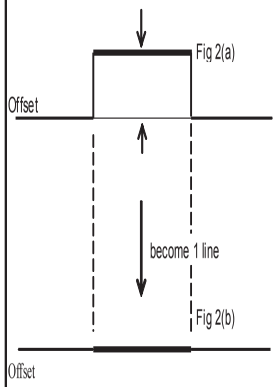
NO	ADJUSTMENT POINT	ADJUSTMENT CONDITION / PROCEDURE	WAVEFORM OR OTHERS
1	SUB COLOUR (I2C BUS CONTROL) **(to be done after sub-picture, sub-tint adj)**	(1) Receive the "PAL Color Bar" signal. (2) Press R/C to set Picture Normal condition. (3) Connect the oscilloscope to R-Amp Transistor Base **(JUMPER 401)** Range : **100mV/Div** (AC) (Using 10:1 Probe) Sweep Time : **10µsec/Div** (4) Using the R/C call **V05** in SERVICE mode. Adjust **V05** bus data, so that the 75% White & Red portions of PAL Color Bar be at the **same level** shown as Fig 1-1. (5) Clear the SERVICE mode.	 Fig. 1-1

NTSC CHROMA ADJUSTMENT

NO	ADJUSTMENT POINT	ADJUSTMENT CONDITION / PROCEDURE	WAVEFORM OR OTHERS
1	SUB-TINT (I2C BUS CONTROL)	(1) Receive the "NTSC 3.58 Color Bar" signal thru AV in. (2) Connect the oscilloscope to B-AMP Transistor Base **(JUMPER 410)**. Range : **100mV/Div** (AC) Sweep time : **10µsec/Div** (3) In Service mode, go to **V07, then** press **R/C Y-mute (Hex E4)** or **FLASHBACK** key. (4) Call the "**V07**" data in service mode. Adjust the "**V07**" bus data to obtain the waveform shown as Figure 1-1. (5) Disable **Y-Mute** by pressing key **(Hex E4)** or **FLASHBACK**, then clear the SERVICE mode.	 Fig.1-1 *NOTE : Please make sure waveform is adjusted until getting good step slope which is can be a straight line slope at the top of waveform step.

13

SECAM CHROMA ADJUSTMENT

NO	ADJUSTMENT POINT	ADJUSTMENT CONDITION / PROCEDURE	WAVEFORM OR OTHERS
1	SECAM BLACK LEVEL R-Y / B-Y (I2C BUS CONTROL)	1) Receive "SECAM ALL WHITE" signal. 2) In the service mode, select service data **V14**. 3) Connect oscilloscope to **TP 801**. Range: **20mV/Div** (AC) (use 10:1 probe) Sweep time: **20usec/Div** 4) Adjust the **V14** so that the offset of R-Y to minimum, shown in **Fig 2(b)**, it means adjust the offset of between No signal line and Signal line to minimum 5) In the service mode, select service data **V15**. 6) Connect oscilloscope to **TP 801**. Range: **20mV/Div** (AC) (use 10:1 probe) Sweep time: **20usec/Div** 7) Adjust the **V15** so that the offset of B-Y to minimum, shown in **Fig 2(b)**, it means adjust the offset of between No signal line and Signal line to minimum	

PROTECTOR OPERATION CHECKING

NO	ADJUSTMENT POINT	ADJUSTMENT CONDITION / PROCEDURE	WAVEFORM OR OTHERS
1	BEAM PROTECTOR	(1) Receive "Monoscope Pattern" signal. (2) Set CONTRAST MAX. (3) Set BRIGHT MAX. (4) During the Collector & Emitter of **Q853/4/5** short, make sure the protector ON and switch to standby mode.	**Note :** **Select one of Q853/4/5 to do each short.**
2	H, V PROTECTOR	(1) Receive "Monoscope Pattern" signal. (2) Connect output of Bias Box to **D602** cathode (C602 positive). (3) Set voltage of Bias Box to **18V** and make sure the protector is not working. (4) Set voltage of Bias Box to **28.5V**. and make sure the protector is working.	
3	OTHER PROTECTOR	(1) Once finish rectified Electrolytic Capacitor short testing in + B line, check all possible damaged components on +B line. (Use random selected set for inspection)	

A/V INPUT & OUTPUT CHECKING

NO	ADJUSTMENT POINT	ADJUSTMENT CONDITION / PROCEDURE	WAVEFORM OR OTHERS
1	VIDEO AND AUDIO OUTPUT CHECK	(1) Receive the "PAL Color Bar" signal (100% White Color Bar, Sound 400 Hz 100% Mod). (2) Terminate the Video output with a 75 ohm impedance. Make sure the output is as specified **(1.0 Vp-p ± 3 dB).** (3) Terminate the Audio output with a 10K ohm impedance. Make sure the O/P is as specified **(1.5 Vp-p ± 3 dB)**.	
2	VIDEO AND AUDIO INPUT CHECK	(1) Using the TV/VIDEO key on the remote controller, make sure that the modes change in order of TV, COMPONENT, AV1,AV2 & TV again and the video & audio output are according to the input terminal for each mode. (2) Video cross-talk AV to TV checking : a) When connect AV1 input, check TV also b) When connect AV2 input, check TV also	**Caution:** AV1 share with YUV. Therefore, if YUV signal is connected to Component In terminal, only component will be detected.
3	COMPONENT IN CHECK	(1) Connect YUV & Audio signal to Component In terminal and Audio terminal. (2) Using the INPUT key on the remote controller, press it until the modes change to COMPONENT confirm output is appear. (3) Audio source is share with AV1	
4	SUB WOOFER OUTPUT CHECK	(1) Receive "PAL colour bar" signal (Sound 400Hz, 100 % Mod.) (2) Set the sound output to 500mW by volume key. (3) Terminate the "Sub Woofer" output with a 22 kΩ impedance. make sure that the output is : 4.0 Vp-p ± 3 dB	

FUNCTION OPERATION CHECKING (VIDEO & AUDIO) (1)

NO	ADJUSTMENT POINT	ADJUSTMENT CONDITION / PROCEDURE	WAVEFORM OR OTHERS
1	CONTRAST Key	(1) Receive "Monoscope Pattern" signal. (2) Set MENU, then go into PICTURE mode to select CONTRAST. (3) Press Volume Up/Down key to check whether the CONTRAST effect is OK or not.	
2	COLOUR Key	(1) Receive "Color Bar" signal. (2) Set MENU, then go into PICTURE mode to select COLOUR. (3) Press Volume Up/Down key to check whether the COLOUR effect is OK or not.	
3	BRIGHTNESS Key	(1) Receive "Monoscope Pattern" signal. (2) Set MENU, then go into PICTURE mode to select BRIGHTNESS. (3) Press Volume Up/Down key to check whether the BRIGHTNESS effect is OK or not.	
4	TINT Key	(1) Receive the "NTSC Colour Bar" signal thru AV in. (2) Set MENU, then go into PICTURE mode to select TINT. (3) Press Volume Up/Down key to check TINT, UP for GREEN direction and DOWN for PURPLE direction whether is OK or not.	
5	SHARPNESS Key	(1) Receive "Monoscope Pattern" signal. (2) Set MENU, then go into PICTURE mode to select SHARPNESS. (3) Press Volume Up/Down key to check whether the SHARPNESS effect is OK or not.	
6	CH DISPLAY COLOUR	(1) All Ch (1~99) will have an OSD display of the channel number in green colour under AFT ON condition.	
7	SURROUND	(1) Receive "music" sound signal. (2) Set MENU, then go into SOUND MENU to select SURROUND. (3) Press VOLUME UP/DOWN key to check SURROUND I, II and OFF effect.	
8	BALANCE	(1) Receive mono-tone signal. (2) Set MENU, then go into SOUND MENU to select BALANCE (3) Press VOLUME UP/DOWN key to check whether the left to right BALANCE effect is OK or not	
9	EQUALIZER	(1) Receive "music" sound signal. (2) Set MENU, then go into SOUND MENU to select EQUALIZER. (3) Press VOLUME UP/DOWN key to check EQUALIZER effect is OK or not	
10	WHITE TEMP	(1) Receive "Monoscope Pattern" signal. (2) Set MENU, then go into PICTURE mode to select WHITE TEMP. (3) Press Volume Up/Down key to check WHITE TEMP function. The back ground will change to (shift right) bluish and (shift left) reddish.	

CHECKING FUNCTION OPERATION (VIDEO & AUDIO) (2)

NO	ADJUSTMENT POINT	ADJUSTMENT CONDITION / PROCEDURE	WAVEFORM OR OTHERS
11	NORMAL Key	(1) Once in PICTURE or SOUND Mode, and the NORMAL key is pressed, all the settings will be preset to normal setting accordingly . (Normal setting value for every AV mode : NEWS/MUSIC/MOVIE)	***Note:** In NORMAL Mode, when press NORMAL key, will appear NORMAL OSD and all setting PICTURE, SOUND functions set to NORMAL.
		PICTURE MODE — *NEWS* / *MUSIC* / *MOVIE* CONTRAST 55 / 60 / 60 COLOUR 0 / 0 / +3 BRIGHTNESS 0 / 0 / 0 TINT CENTER / CENTER / CENTER SHARPNESS 0 / 0 / +3 PICTURE NR OFF / OFF / OFF WHITE TEMP Mid / Mid / Mid	
		SOUND MODE SURROUND OFF / OFF / OFF BALANCE 0 / 0 / 0 AVL ON / ON / ON	
		EQUALIZER MENU * Bar indicator display 0~20 100 10 / 14 / 14 300 10 / 9 / 8 1K 12 / 7 / 9 3K 11 / 8 / 8 8K 10 / 12 / 11	
12	COLOUR SYSTEM	(1) Receive the "PAL COLOUR BAR" signal, press MENU, choose CH-SETTING to select COLOR modes except PAL, check the COLOUR is not working properly. Then, select the "PAL" mode. Check again its colour so that it is working properly. (2) Receive "SECAM COLOUR BAR" signal, press MENU, choose CH-SETTING to select COLOR modes except SECAM, check the COLOUR is not working properly. Then, select the "SECAM" mode. Check again its colour so that it is working properly. (3) Receive "NTSC 4.43" signal, press MENU, choose CH-SETTING to select COLOR modes except N443, check the COLOUR is not working properly. Then, select the N443 mode. Check again its colour so that it is working properly. (4) Receive "NTSC 3.58 COLOUR BAR" signal , press MENU, choose select COLOR modes except N358, check the COLOUR is not working properly. Then, select the N358 mode. Check again its colour so that it is working properly	
13	SOUND SYSTEM	(1) Receive "PAL-D/K" signal, press MENU, choose CH-SETTING then go into SOUND mode to select B/G, I Check the sound output is not working properly. Select D/K and check the sound output to make sure it is working properly. (2) Receive "PAL-I" signal, press MENU, choose CH-SETTING then go into SOUND mode to select B/G, D/K. Check the sound output is not working properly. Select I and check the sound output to make sure it is working properly. (3) Receive "PAL-B/G" signal, press MENU, choose CH-SETTING then go into SOUND mode to select I, D/K. Check the sound output is not working properly. Select B/G and check the sound output to make sure it is working properly. (4) Receive "NTSC3.58 -M" signal, press MENU, choose CH-SETTING then go into SOUND mode to select I, D/K. Check the sound output is not working properly. Select M and check the sound output to make sure it is working properly.	

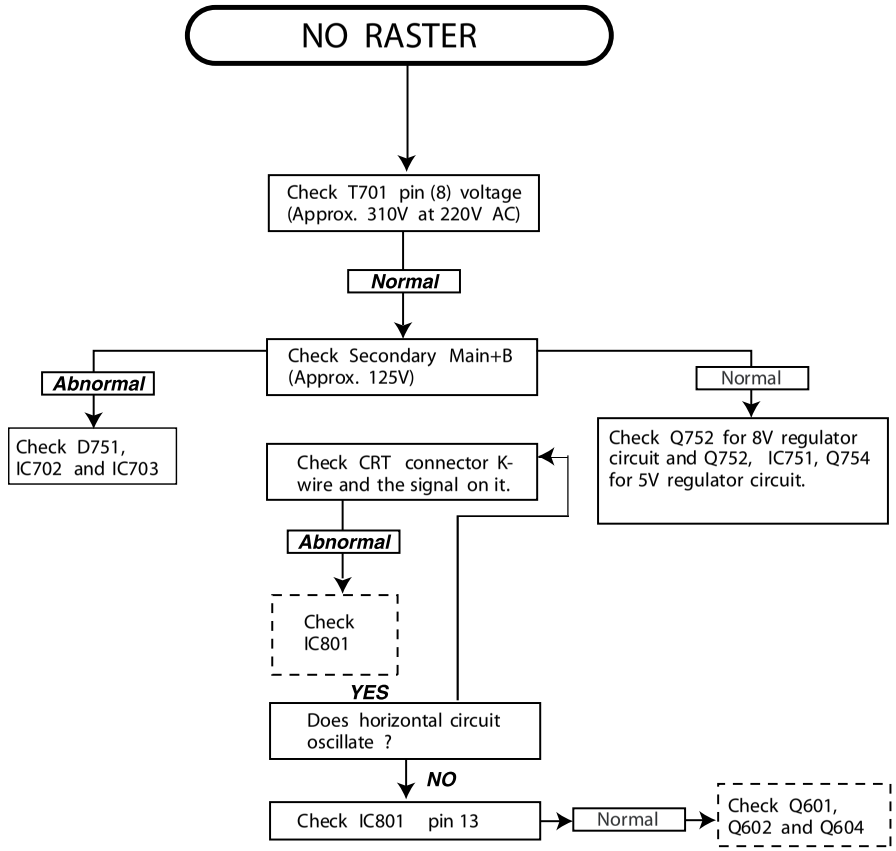
CHECKING FUNCTION OPERATION (VIDEO & AUDIO) (3)

NO	ADJUSTMENT POINT	ADJUSTMENT CONDITION / PROCEDURE	WAVEFORM OR OTHERS
14	NOISE MUTE CHECKING	(1) Receive "PAL COLOUR BAR" signal. (2) Turn up the volume control to maximum, make sure the sound is heard from the speakers. Then put the unit in no signal state. (3) Check the sound mute is effective. (4) Finally turn sound level of CTV to minimum.	
15	OSD LANGUAGE QUANTITY CHECK	(1) Check OSD LANGUAGE quantity and type for respect model.	

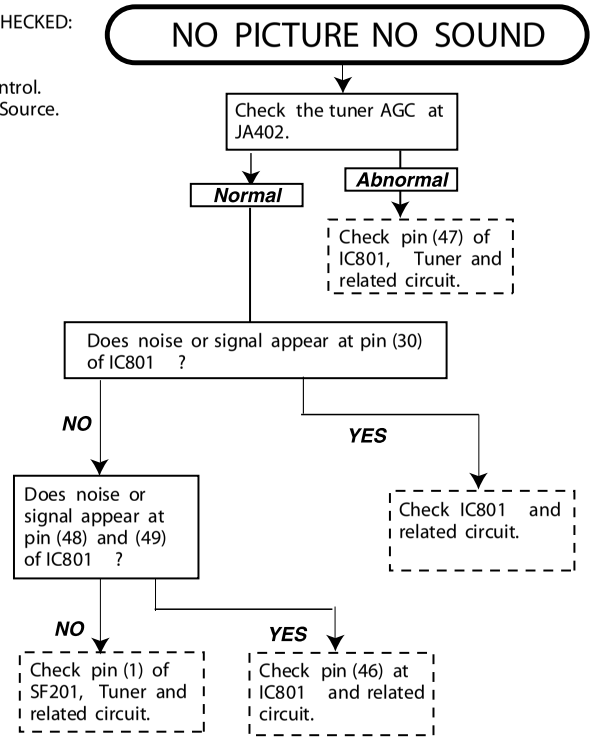
MODEL	QUANTITY	ENGLISH
21DXS200	1	O

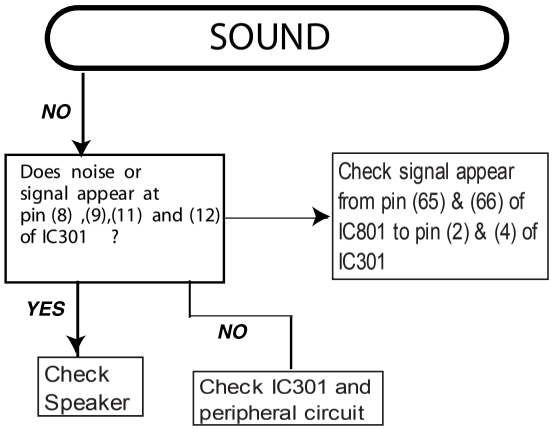
SHOCK TEST CHECKING.

NO	ADJUSTMENT POINT	ADJUSTMENT CONDITION / PROCEDURE	WAVEFORM OR OTHERS
1	SHOCK TEST	(1) Hit at the top of TV set for two time. (2) Check TV set not damage and TV operation operate correctly.	


NO RASTER
Check T701 pin (8) voltage (Approx. 310V at 220V AC)
Normal
Check Secondary Main+B (Approx. 125V)
Abnormal
Check D751, IC702 and IC703
Normal
Check Q752 for 8V regulator circuit and Q752, IC751, Q754 for 5V regulator circuit.
Check CRT connector K-wire and the signal on it.
Abnormal
Check IC801
YES
Does horizontal circuit oscillate ?
NO
Check IC801 pin 13
Normal
Check Q601, Q602 and Q604

CIRCUITS TO BE CHECKED:
- Tuner.
- PIF.
- Automatic Gain Control.
- (5V), (32V) Power Source.


NO PICTURE NO SOUND
Check the tuner AGC at JA402.
Normal
Abnormal
Check pin (47) of IC801, Tuner and related circuit.
Does noise or signal appear at pin (30) of IC801 ?
NO
YES
Does noise or signal appear at pin (48) and (49) of IC801 ?
Check IC801 and related circuit.
NO
YES
Check pin (1) of SF201, Tuner and related circuit.
Check pin (46) at IC801 and related circuit.


SOUND
NO
Does noise or signal appear at pin (8) ,(9),(11) and (12) of IC301 ?
Check signal appear from pin (65) & (66) of IC801 to pin (2) & (4) of IC301
YES
NO
Check Speaker
Check IC301 and peripheral circuit

NEITHER VERTICAL NOR HORIZONTAL SYNCHRONIZATION

CIRCUIT TO BE CHECKED:
Sync. Separator Circuit.

Check pins (9), (13), and (14) of IC801.

DEFECTIVE VERTICAL AMP. AND VERTICAL LINEARITY

Re-adjust vertical size. (Bus Data)

Vertical linearity and size are abnormal.

Check R503, R515, R513 R514. R520. and C515

NO VERTICAL SCAN

Check C511

NO SPECIFIC COLOUR

Is some colour produced in B/W broadcast reception ?

YES

Check IC801.

NO

Is the white balance properly adjusted ?

YES

NO

Re-adjust the white balance.

The picture colour is cyan.

Check Q855 and its adjacent circuits.

The picture colour is magenta.

Check Q844 and its adjacent circuits.

The picture colour is yellow.

Check Q853 and its adjacent circuits.

NO COLOUR

Check IC1001 and bias control circuit.

Normal

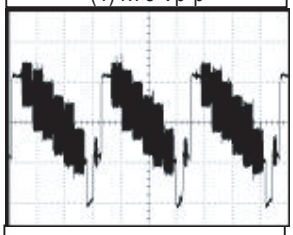
Check X801 (4.43MHz)

Normal

Check Q202 and peripheral circuit

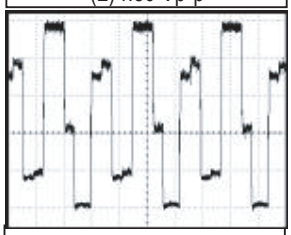
WAVE FORM

(1)1.78 Vp-p



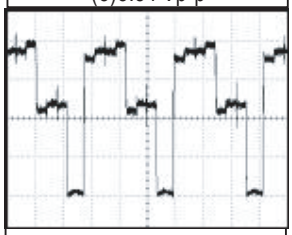
Horiz. Rate

(2)4.80 Vp-p



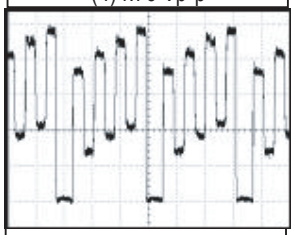
Horiz. Rate

(3)3.84 Vp-p



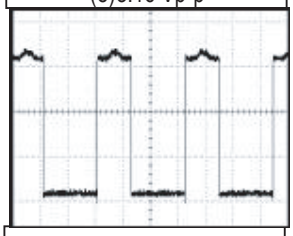
Horiz. Rate

(4)4.76 Vp-p



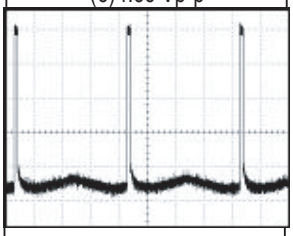
Horiz. Rate

(5)3.16 Vp-p



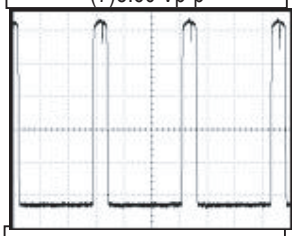
Horiz. Rate

(6)4.66 Vp-p



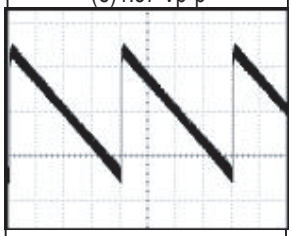
Vert. Rate

(7)5.60 Vp-p



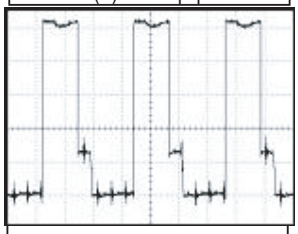
Horiz. Rate

(8)1.57 Vp-p



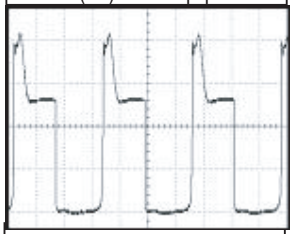
Vert. Rate

(9)2.60 Vp-p



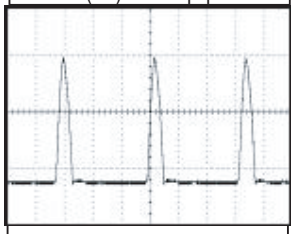
Horiz. Rate

(10)20.80 Vp-p



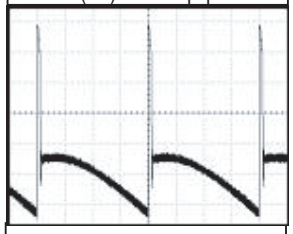
Horiz. Rate

(11)1110 Vp-p



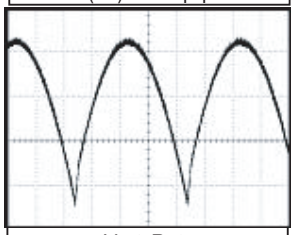
Horiz. Rate

(12)63.40 Vp-p



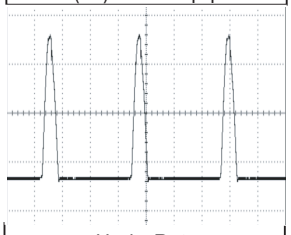
Vert. Rate

(13)7.52 Vp-p



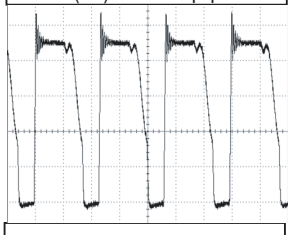
Vert. Rate

(14)147.00 Vp-p



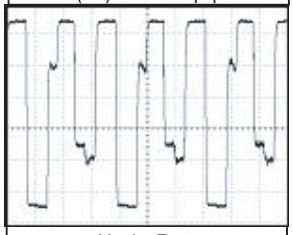
Horiz. Rate

(15)542.00 Vp-p



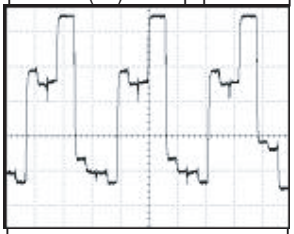
-

(16)118.00 Vp-p



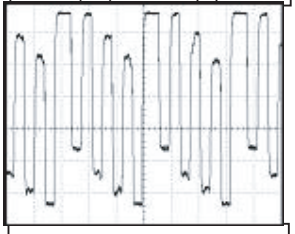
Horiz. Rate

(17)96.4 Vp-p



Horiz. Rate

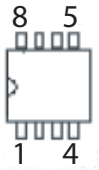
(18)118.80 Vp-p



Horiz. Rate

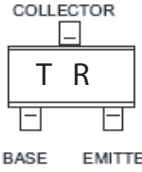
[1] SOLID STATE DEVICE BASE DIAGRAM

TOP VIEW

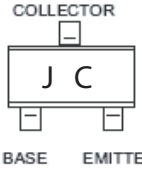


M24C16

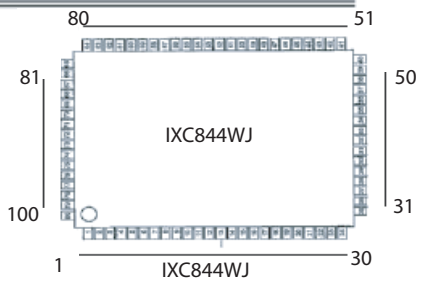
3928



A1530



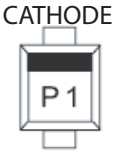
C2735



EXA520WJ

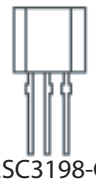
EXA535WJ

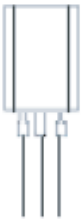
EXA572WJ



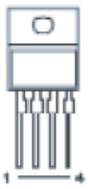
ISS356

SIDE VIEW

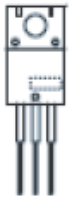

2SC3198-G
2SC3198-Y

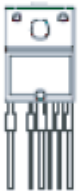

2SD468-C

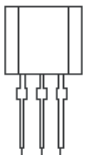
C6090++1

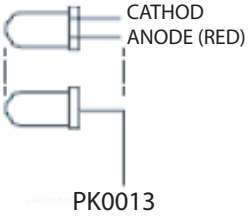


KIA78R05


2SD1913


STRW6553


2SA1266



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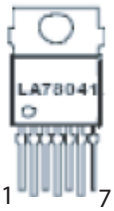
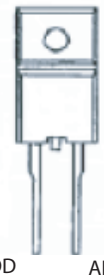
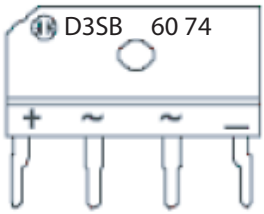


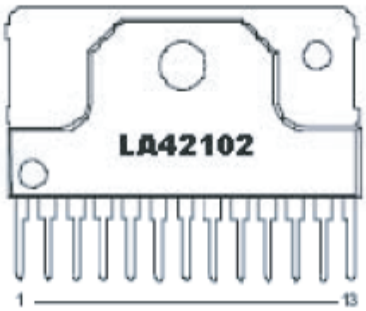
LA78041



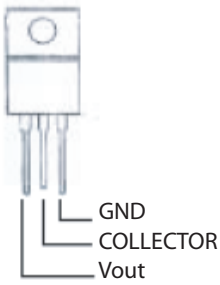
DX0445CE



DX0470CE



LA42102+



SE125N++

DESCRIPTION OF SCHEMATIC DIAGRAM

SAFETY NOTES:

1. *DISCONNECT THE AC PLUG FROM THE AC OUTLET BEFORE REPLACING PARTS.*
2. *SEMICONDUCTOR HEAT SINKS SHOULD BE REGARDED AS POTENTIAL SHOCK HAZARDS WHEN THE CHASSIS IS OPERATING.*

IMPORTANT SAFETY NOTICE:

PARTS MARKED WITH "⚠" ( ) ARE IMPORTANT FOR MAINTAINING THE SAFETY OF THE SET. BE SURE TO REPLACE THESE PARTS WITH SPECIFIED ONES FOR MAINTAINING THE SAFETY AND PERFORMANCE OF THE SET.

SERVICE PRECAUTION:

THE AREA ENCLOSED BY THIS LINE (▬ ▬ ▬) IS DIRECTLY CONNECTED WITH AC MAINS VOLTAGE.
WHEN SERVICING THE AREA, CONNECT AN ISOLATING TRANSFORMER BETWEEN TV RECEIVER AND AC LINE TO ELIMINATE HAZARD OF ELECTRIC SHOCK.

NOTES:

1. *The unit of resistance "ohm" is omitted. (K = 1000 ohms, M = Mega ohm).*
2. *All resistors are 1/16 watt, unless otherwise noted.*
3. *All capacitors are μF, unless otherwise noted. (P = μμF).*

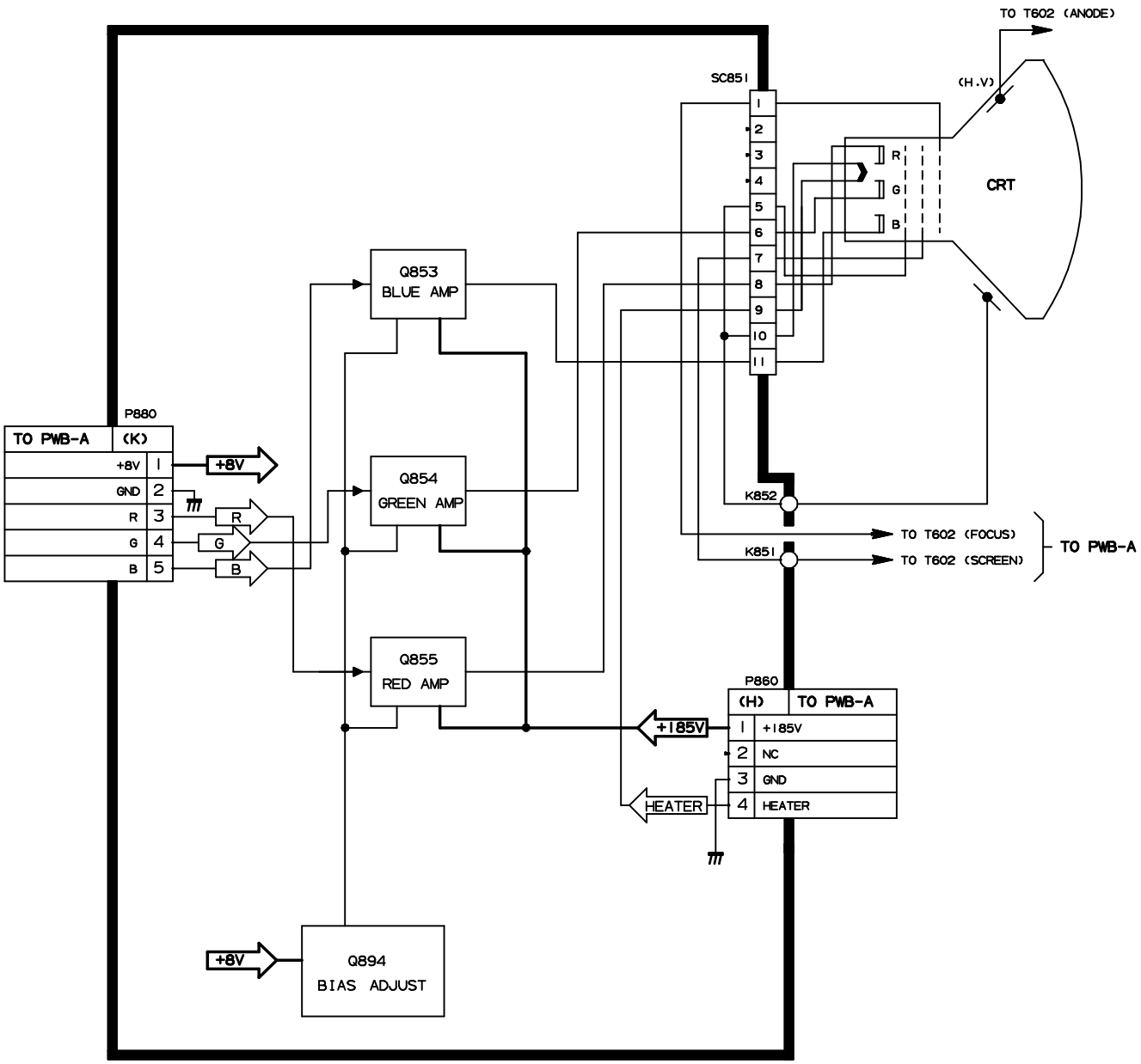
VOLTAGE MEASUREMENT CONDITIONS:

1. *Voltages in parenthesis measured with no signal.*
2. *Voltages without parenthesis measured with 3mV B & W or Colour signal.*
3. *All the voltages in each point are measured with VTVM.*

WAVEFORM MEASUREMENT CONDITIONS:

1. *The colour bar generator signal of 1.0V peak applied at pin (24) of IC201.*
2. *Approximately 4V AGC bias .*

CRT BLOCK


TO T602 (ANODE)
(H.V)
SC851
1
2
3
4
5
6
7
8
9
10
11
R
G
B
CRT
Q853
BLUE AMP
Q854
GREEN AMP
Q855
RED AMP
P880
TO PWB-A
(K)
+8V 1
GND 2
R 3
G 4
B 5
+8V
R
G
B
K852
K851
TO T602 (FOCUS)
TO T602 (SCREEN)
TO PWB-A
P860
(H)
TO PWB-A
1 +185V
2 NC
3 GND
4 HEATER
+185V
HEATER
+8V
Q894
BIAS ADJUST

TV ENG DEPT.

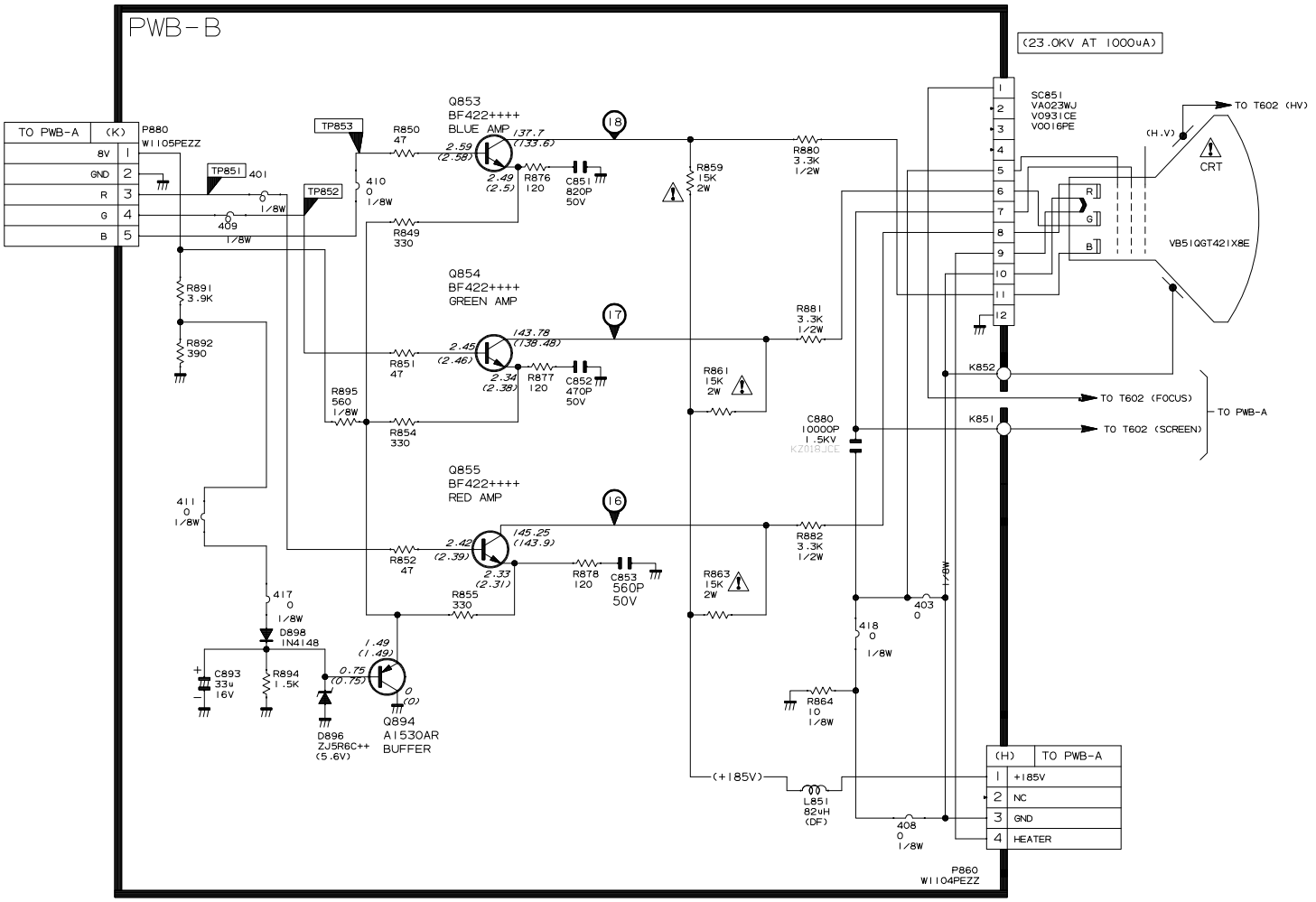
NOTE: 1.THE UNIT OF RESISTANCE "OHM" IS OMITTED
(K=1000 OHMS, M=MEGAOHM).
2.THE UNIT OF ALL CAPACITORS ARE F WITH PREFIX SYMBOL
(u, P, ETC).

MODIFIED DATE	2008.12.01
CREATED DATE	2008.04.01

REPLACE WITH A PICTURE TUBE OF THE SAME TYPE NUMBER FOR CONTINUED SAFETY.

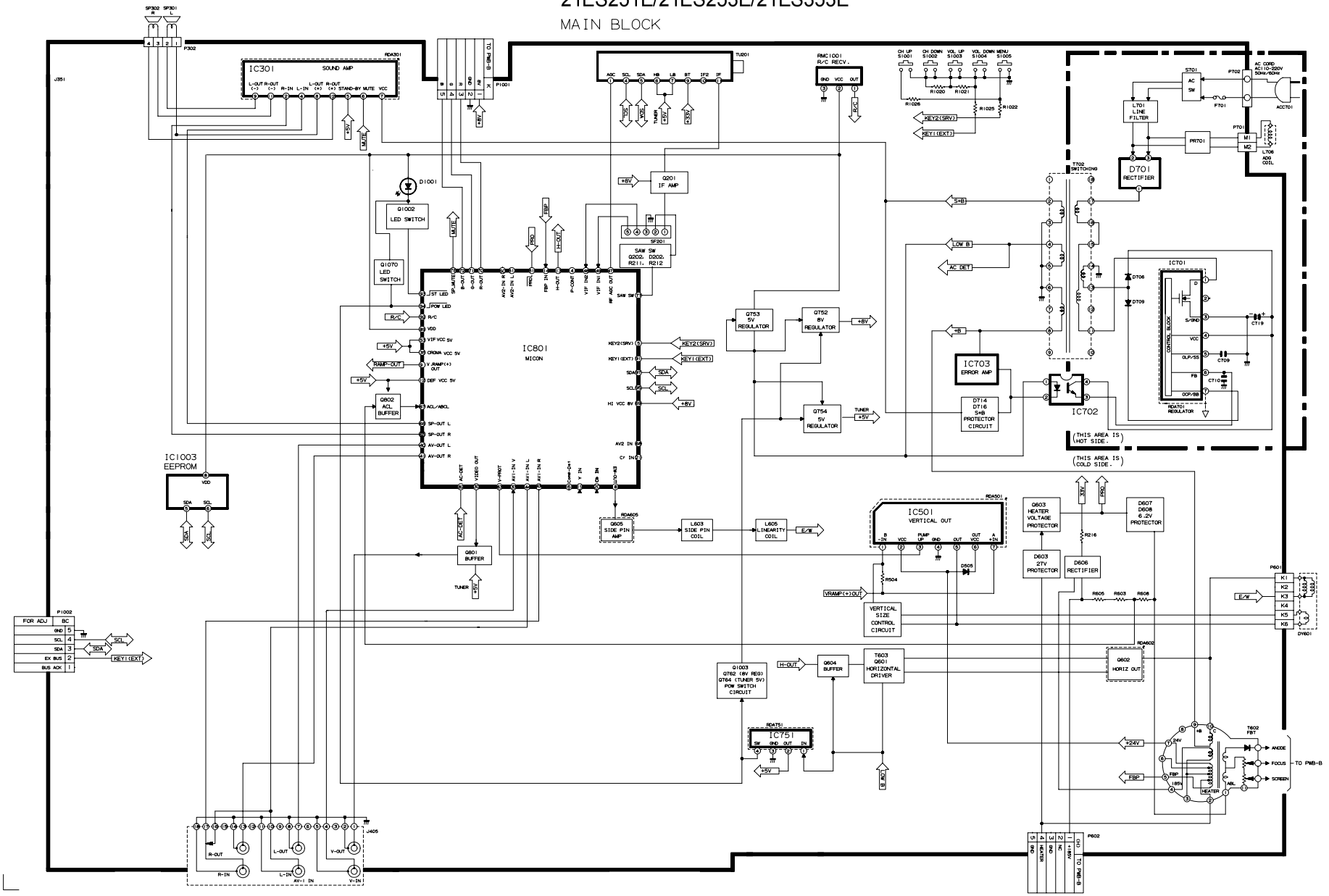
⚠ AND SHADED( ) COMPONENTS = SAFETY RELATED PARTS.
▲ MARK = X-RAY RELATED PARTS.

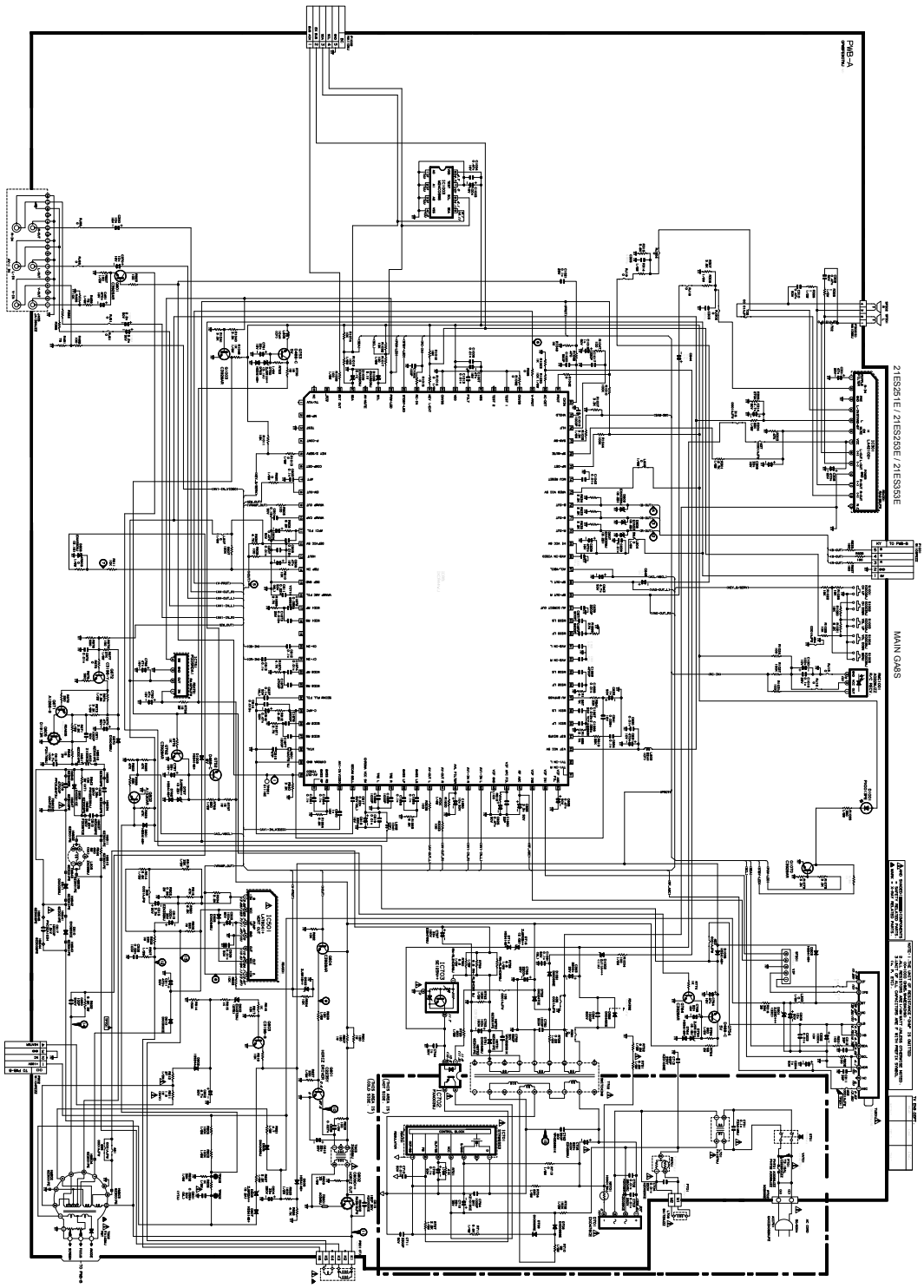
GA-8S CRT (All 21"US)
21EPS258E / 21EMS258E / 21ECS258E / 21ES251E / 21ES353E / 21ES253E



21ES251E/21ES253E/21ES353E

MAIN BLOCK




MAIN G49S
21ES25/1E / 21ES25E / 21ES35E / 21ES35E

SHARP

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